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MILITARY GEOLOGY

CHAPTER 12. MILITARY-GEOLOGICAL SURVEY (RAZVEDKA) AND PROSPECTING (RAZVYEDKA)

The Army maintains a military-geological service in time of peace as well as during war. In the former case, the duties of this service are limited to the search for strategic raw materials, the preparation of geological study of Russian territories and frontiers from the standpoint of military engineering and the geological study of the territories of neighboring countries. Special military-geological maps with accompanying reference tables are prepared beforehand. In the second case, when war has already begun, a distinction is made between rear echelon military-geological work during the period of mobilization, and military-geological work at the front.

The nature of military-geological work in peacetime and during mobilization is similar to ordinary geological surveys conducted for various civil purposes; only certain aspects of military-geological work are called for under these conditions. A considerable length of time, however, is granted for the completion of projects.

Since military-geological investigation at the front is conducted under adverse conditions, the time for the realization of projects is very limited; assignments must be fulfilled within a very short period, usually a few hours and under the best circumstances i.e., during the withdrawal of forces to a new, previously prepared defensive zone seldom more than one or two days. Such short time limitations are essentially characteristic of modern warfare. This situation, however, may be altered by position warfare in a sector of a stabilized front. Front-line military-geological missions are carried out in order to provide support for maneuver by various forces. To assist in the execution of various types of military engineering tasks during offensive and defensive engagements data is gathered on terrain and road traversability and on water supplies. Every type of military engineering work with its own specified tactical and technical requirements confronts the military-geological researchers.

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In the execution of these projects by officers of the engineers, surveying and prospecting are carried out in close liaison with the surveying and prospecting by large-unit commanders and officers of the various, specialized branches of the Army (armored units, aviation, artillery, etc.). Commanding officers of the engineers (divisional engineers, etc.) independently must solve simple geological problems, using special military-geological documents. Therefore such documents must be readily comprehensible to those who are not specialists in the field of geology.

If specialists (military geologists) are assigned to solve military-geological problems, they must carry out on the front two types of military-geological research, military-geological survey and military-geological prospecting, in close liaison with surveying and prospecting by the commanders.

Military-geological survey is concerned chiefly with obtaining data on existing natural and artificial outcroppings of rock layers, subterranean water, and, as a rule, is not accompanied by prospecting activities, whereas military-geological prospecting is conducted with the use of drilling and excavation works. The former encompasses large areas of operational importance, such as the defense of areas occupied by regiments, divisions, etc. The latter conducts a more detailed investigation of smaller areas noted during survey operations as being the least clear in their geological features or the most important in their relationship to the conduct of military engineering work.

In view of the extremely limited time which the military-geologist on the front may have at his disposal, the importance of the part played by military-geological survey must be heavily emphasized. The military geologist at the front will have the use of specialized military-geological documents (military-geological maps with supplementary reference charts) and other geological materials of military-topographical and military-geographical descriptions. But often he is also obliged to supplement the geological material on hand or make corrections in relation to new objectives arising from specific, concrete circumstances. It is undeniable that direct observation at the spot will be made extremely difficult -- and sometimes impossible -- by combat conditions. This situation will place a special responsibility on the military geologist who will be required to make sufficiently accurate generalizations based on a minimum of gathered data (geomorphologic information, outcropping of strata, subterranean water, aerial photography data, etc.) He must furnish practical solutions to problems of terrain and road traversability for various types of troops, emphasizing various natural obstructions and the sections which are especially inaccessible to tanks, solutions to the problems of water supply, and other operations such as fortification construction, underground mine-laying, military-hydrotechnical problems, military road building, bridge-crossing, landing fields, and field camouflage.

In making a sufficiently complete description of the existing conditions of a sector, the military-geological surveying missions must emphasize the following:

1. Relief features and their significance in various specialized, military respects (capacity for being surveyed, suitability for the conduct of fire, adaptability for various military engineering operations, negotiability by different types of troops, etc.)

2. Rivers, lakes, swamps, seacoasts and bays, with an evaluation of their navigability or traversability.

3. Soil. The presence of sod should be noted, and the adaptability of the ground for road and landing-field operations, denoting its suitability for camouflage construction, etc.

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4. Strata which compose the upper parts of the locale, with indications of the geological composition and the location of the upper layers, and likewise the basement rock, noting its availability and firmness in escarps [slopes] for construction of walls, etc.

5. Depths of subsoil water, direction of flow, quantity and quality.

6. Presence of water sources (wells, springs, etc.)

7. Physical-geological appearance.

8. Construction materials, conditions governing their exploitability and their accessability.

In case a survey operation of a sector is limited, and in the absence of outcroppings of strata and subsoil water, military-hydrogeological surveying is supplemented by prospecting works and becomes military-geological prospecting.

The problem of the military geologist is to render correct judgement without the aid of prospecting operations, which are certainly not always feasible on the front.

If, however, it is necessary to resort to prospecting operations, they must be limited to the area of fortifications and other constructions and to the required geological information of the area, making use at the same time of the prospecting findings as sources of information for field water supply.

Basically, military-engineering prospecting is very simple. The work merely consists of making clearings, digging shallow holes, laying pipes (from 5 to 10 meters) or drilling sounding holes (not exceeding 10 meters). Only in exceptional cases do diggings by front-line prospecting reach a depth of 12 to 15 meters.

Entrenching tools and other regular army equipment used by troops for field water supply, shall be employed in prospecting operations. Entrenching equipment consists of small shovels (individual), combat engineer shovels, picks, mattocks, and crowbars (portable). With these it is possible to dig clearings and sink holes or pipes. Standard drilling equipment, designated purely for prospecting operations, consists of a ground auger and a drilling set, 78/89 mm. The first is used for depths of 10 meters and the second for depths of 30 meters. The hole made with the ground auger is used to install a small, tubular well (MTK) from which water is drawn by a hand pump. A Letestiebx [?] rod or a rod-operated pump is used to draw water from holes drilled by the 78/89 mm set. This drilling equipment is standard equipment of a division or corps, but also may be assigned to a regiment. Among army drilling equipment are the ABR-50 and AMV-100 truck-mounted boring machines which permit sinking a shaft to a depth of 50 to 100 meters. The water is drawn by piston pumps [?] installed with the aid of MG-3 windlass. These rotary drills permit quicker investigation for a nonextensive study than by manual drills.

In special cases, specialized military-geological detachments are provided with equipment used in the ordinary civilian geological investigations.

Military geologists may be employed with front-line and army echelon staffs, and in some cases in much smaller units. Their work in specialized military-geological detachments (VGO), manned by appropriate staffs and complete with specialized equipment and provisions, may be considered as a special function of military geologists. These military-geological detachments may serve with front-line, army echelons, and other large military units (soedinyenie) in order to determine the course of operations, defense

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lines, fortified areas, etc.

The front-line military-geological surveying mission may travel on foot, on horse, or motor vehicle. In an examination of a small area, military geologists conduct surveying on foot, but equipment is transported in carts, motorcycles, or automobiles. The military geologists most often employ horses or motorized vehicles (either motorcycle or automobile). The mode of travel depends wholly upon local conditions, the weather, specific front-line conditions, etc. It is preferable to provide military-geological detachments with motorized vehicles.

As the result of military-geological surveying and prospecting a military-geological report is drawn up, as briefly as possible in the form of geological sketches in various scales. If the work of the military geologist on the front is related to the support of tactical objectives, military-geological sketches are usually scaled to 1:10,000, 1:25,000, and 1:50,000. These sketches are made on blank map forms, on tracing paper, and even on topographical maps, scale 1:50,000.

Maps enlarged from maps whose scale is smaller than 1:50,000 and diagrammatic maps, made up as the result of approximate surveys, can be used in composing sketches.

Depending upon the objectives established, military-geological sketches should provide answers to one or more military engineering questions.

The following types of sketches are drawn:

1. Sketches of terrain, denoting areas inaccessible to tanks (areas of deep ravines, steep and precipitous slopes, very rocky areas, marshy areas, turf pits, outlets of subsoil water, etc.), areas of soil with different composition, roads (with a description of their traversability shown by sections and for the various seasons of the year), areas flooded at time of high water, fords and river crossings, lakes, time of their freezing and breaking-up [melting], etc.

2. Sketches, showing water sources, indicating rivers, lakes, springs, wells, water holes, kyarizy [?], reservoirs, water-pipes, etc. These water sources are described with regard to quantity and quality and to their availability (the means of approach, capacity for camouflage, reliability of water sources, restoration operations, etc.). Possible subwater sources available through the use of wells and water holes are shown. Water-supply areas are clearly set off.

3. Sketches, showing source of construction materials and indicating excavation pits, quarries and unexploited out-croppings of construction materials (stone, gravel, sand, clay, etc.), and areas where previously prepared construction material may be had, such as stone in cemeteries, in buildings, etc. The sketches should denote: (a) availability and quality of construction materials, (b) the location of capping stratum and productive deposits, and (c) adaptability, means of processing, and accessability.

4. Geological-hydrogeological sketches, to show the first layer down from the surface and the basement rock layer. The thickness of the first layer must be noted (if not exactly, in graded approximations, for example: 0-1 meter, 1-5 meters, 5-20 meters, and over 20 meters, etc.). It is best to represent the top layer by cross hatching, but the basement rock layer should be represented in a solid color. The depths of the first water-bearing strata, for instance, and of the underlying water-bearing strata (graded approximations may be used) are noted by numbered countour indications. If there is a sufficient number of natural (springs) and artificial (wells) water outlets it is possible to represent the top water-bearing strata by "hydro-structure contours." When geological and hydro-geological data are difficult to consolidate, geological and hydrogeological sketches are made separately.

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In order to avoid voluminous documentary reports, the military geologist must strive for the composition of a single military geological sketch, complex in its content, showing strata and occurrence of subsoil waters, water provision, terrain and road traversability, deposits of construction materials, and answers to all practical military engineering questions which may arise in each specific case on the front, such as condition of fortification construction, underground mine-laying, inundation and swamping, field water supply, possibility of flooding an enemy fortified position, etc.

Troop commanders or commanders of the engineers are interested in geological answers only having the most important bearing upon the resolution of specific, operational-tactical problems on the front. Therefore, the military geologist at the front must often compose sketches giving the bare essentials and maps of a specifically designated purpose.

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